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DEPARTMENT OF PARKS AND WILDLIFE

CALM SID NEWS

Newsletter of the Science & Information Division, Department of Conservation and Land Management

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Next deadline
Wed, 25 Oct 95

DIVISIONAL NOTES

Group notes

BIORESOURCES GROUP

Acting arrangements

For those of you who still don't know, Judy Wheeler is Acting Director of the Herbarium while Neville is in Crawley, and Terry Macfarlane is Acting Section Manager Species Resources. This arrangement is to be in place until December 27.

SUSTAINABLE RESOURCES GROUP

Acting arrangements

Lachie McCaw is acting Natural Products Section Manager from September 11 until a new manager is appointed to replace Neil Burrows, who is now Bio-conservation Head of Group.

Centre notes

DWELLINGUP

Surplus Equipment

Dwellingup SID has some surplus equipment:

- Bradford Gold Insulation R2.5 Batts - 19 packs of 8 batts (4.5 sq m per pack) $20/pack.
- Black poly pipe - 1.5 rolls of 50mm x 2.9 x 100m $150
- Canon NP3725 photocopier - in good working order - $1500

Phone Robyn or Barb at Dwellingup SID on 538 1105.

HERBARIUM

Library

Beng Siew will be away in the USA from Sep 1 to Oct 16. The library will be manned by Angie on Tues, Thurs, Fri mornings (9.30-12.30). If you have any interlibrary loan requests please fill in forms as usual and Angie will forward them to Lisa Wright at Woodvale who will process them. Unfortunately the journals that come from the Ag Dept will not circulate here while Beng Siew is away.

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KARRATHA

Pilbara Progress

Stephen Van Leeuwen and Bob Bromilow have been busy in the Pilbara environs over the past few months. Most of their work hes been in the field, which at present is in a multi-coloured landscape, as many plants are in flower. The season is the best in the six years that Stephen has been in Karratha, with many pastoralists suggesting that it is the best 'Season' in the past twenty years.

Two brief trips, as part of the Biological Survey of Barlee Range Nature Reserve, have been completed with varying degrees of success. While numorous species were collected for the first time in four years (eg. *Drosera indica*, two *Stylidium* species) the fickle flowering of others hindered collecting specimens. This is especially true for a novel *Wurmbea* species found in the reserve (*Wurmbea* 'saccata', T.McFarlane in press) which flowered a month earlier than usual. Unfortunately, heavy rainfall associated with cyclone Bobby washed away three sampling grids and destroyed the newly erected boundary fence (joint operation between SID and Pilbara Operations) which restricted cattle entry into the reserve. The next and final sampling trip to Barlee Range is planned for early September and will involve SVL, BB, Phil Fuller, a CALM Volunteer and District staff from Exmouth.

A reconnaissance of the Southern Little Sandy Desert was undertaken as part of the biological survey of this region. Personnel involved included SVL, BB, Andrew Burbidge and PF. They were accompanied by a seed collector from Kings Park, two accomplices from the Royal Botanic Gardens Sydney and, during the last few days of the trip, Steve Hopper. This trip was very successful with 15 sampling sites selected around three camps along a north - south gradient. Familiarity with this generally inaccessible area was obtained with the aid of a helicopter. Several new populations of *Eucalyptus ramellana* and a novel *Calothamnus* were identified from the helicopter and inspected during ground traverses. Three of these new populations of *E. ramellana* were within the bounds of the proposed Carnarvon Range National Park. A quick landing and botanical recce on Mt Essendon, at the north Western end of the Carnarvon Range, resulted in the collection of *Thryptomene wittweri* (DRF species previously known from Mt Meharry and Mt Augustus) and a twining *Thysanotus* which is identical to a taxon located on Mt Meharry. At the base of Mt Essendon, two mallee eucalypts from the Carnarvon - Murchison Region and *Acacia hamersleyensis*, a Hamersley Range endemic (not any more!) were also collected.

The botanical survey of Hamersley Range Hilltops has also commenced with the use of a helicopter to reach some of the more remote hlltops. To date nine hilltops have been visited with in excess of 250 plant specimens being collected. Each hilltop visited has had at least one priority flora species present and at least one species not familiar to SVL. BB has also been supervising a the clearing of new firebreaks (with a BHP Iron Ore supplied grader) around nine experimental plots which will hopefully be burnt next year as part of the Fire - Mulga Study. This study is being conducted in conjunction with Tony Start and PF. Firebreaks cleared two year ago by SVL and BB no longer exist and CALM does not have the machinery in the Pilbara to assist with their rehabilitation.

While in the office, work has continued on preparation of the biological survey for the 'Marandoo to Great Northern Highway Road' which runs through Karinjini National Park. Close liaison has continued with the Main Roads Western Australia and all recommendations regarding rare and poorly known flora presented in draft copies of the report have been implemented by the project proponents. BB has been busy producing vegetation maps of the proposed road and coming to terms with MapInfo. Progress reports for funding agencies have also been prepared. The Pilbara Regional Herbarium has had a new air-conditioning system installed which should prevent any future outbreaks of mould similar to the one experienced in March, which contaminated the collection resulting in the loss of about 200 specimens. Organisational work has also been undertaken for the Burrup Peninsula Biological Survey which should start in the next few weeks.

Pilbara Habitat Posters

Greening Western Australia, CALM, Hamersley Iron and BHP Iron Ore have just released a series of Pilbara Habitat posters which were developed in consultation with SVL and regional staff. The posters are available from Greening Western Australia and Margaret Pieroni's artwork makes them an attractive addition to any wall. There are five posters in tha Pilbara Series consisting of consisting Wildflowers, Mangrove Communities, Tussock Grasslands, Hummock Grssslands and Paperbark Forests. The posters are similar in design to the Banksia Woodland poster which some staff may have seen.

Steve van Leeuwen, Karratha

MANJIMUP

Staff

Dr Elaine Davison resigned from CALM on July 20 but intends to continue work as a consultant plant pathologist working with government and private organisations. Good luck Elaine!

Joanne Elliot will be commencing a year's maternity leave in October. Interviews to find a replacement clerical officer for Manjimup Centre are to be held in the near future. We are expecting Jo back next year, but trust that she will enjoy the change of job in the meantime!

Safety

Ian Wheeler has accepted the position of Safety Coordinator for Manjimup Centre for a two year period commencing August this year. Thanks to Ian for expressing interest in the job and displaying an interest in the health and welfare of his workmates.

Presentation by Professor Attiwill

Dr Peter Attiwill, Associate Professor of Botany at the University of Melbourne, gave a presentation on disturbance of forest ecosystems - the scientific basis for conservative utilisation to SID and other CALM staff at Manjimup on 16 August. His presentation was based around two comprehensive review papers published in 'Forest Ecology and Management' in 1994, and focused on the regeneration processes in *Eucalyptus regnans* forests in Victoria.

Revisiting Old Data - Well Matured Or Over The Hill?

The short item in the previous edition of SIDNews regarding the Helms assessment line in jarrah bush at Dwellingup raised some interesting points about the value of long term records, particularly in the case of long-lived forest and woodland ecosystems. In searching for information about the establishment and early treatment of brown mallet (*Eucalyptus astringens*) plantations at Dryandra, with the skillful assistance of Trevor McGill at Como Records Branch, Lachie unearthed a set of data from a thinning experiment established in 1937. Growth data was available for measurements in 1937, 1939, 1952 and 1954; other more recent data may exist, but weren't on file. These data provided a useful and unique source of information about stand dynamics of brown mallet, which will be of use to Narrogin District staff currently evaluating future management options for mallet at Dryandra. On a field visit with Steve Gorton (Narrogin) and Jack Bradshaw (Forest Management Branch) the plots were re-located, even down to the original numbered wandoo corner pegs which were still sound after 60 years in the ground. The trees themselves, now approacing 80 years old, remain vigourous and healthy and look to have another 80 years of growth left in them. The stand is also home to a prolific population of yellow orchids (*Caladenia*). No doubt there are a number of other valuable sites scattered around that could yield interesting data on long term growth and dynamics of south-west ecosystems.

Surplus Equipment

Manjimup is currently disposing of surplus equipment:

- a pipe roofrack to fit a 2 tonne truck
- a cargo barrier to fit a 1989 Holden jackaroo
- a tubular steel roofrack to suit same vehicle

There are a few other odds and sods to be disposed of also - contact Joanne Elliot or John Neal at Manjimup.

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Special Announcements

Windows 95

As you may be aware Windows 95 is now available. Microsoft is bombarding the press and registered users with info on how to upgrade. And no doubt it will start proliferating as people take advantage of competitive upgrade offers or purchase new machines with Windows '95 pre-installed.

This subject has been discussed extensively in ISS and we've come to the view that now is not the time to upgrade. We have no wish to sound like a bunch of Luddites but we strongly counsel you to hold off from upgrading to Windows 95, if at all possible, for at least six months.

There has been a great deal of controversy in the computing press regarding the readiness of this product. Whilst reviewers are pleased with the improved aesthetics they are generally scathing of its robustness or reliability. In any case, there are as yet only a few programs that have been specifically recompiled to take advantage of Windows 95's new features and architecture. Most of our existing programs will not show any change in performance. Some may not even run at all under Windows 95.

Unless you want a dramatic decline in productivity (and little or no expertise from other staff to help you out) we suggest we leave the final beta-testing of Windows 95 to those who don't mind being guinea pigs. In particular, purchasers of new computers should clearly stipulate that they are to be supplied with Windows 3.1 or 3.11 rather than Windows95. If you have any further queries on this don't hesitate to ask anyone in ISS.

paulg@wood.sid

Bridal Creeper Symposium

A one day symposium and workshop on the environmental weed bridal creeper (*Myrsiphyllum asparagoides*) will be held at the Training Centre, CALM SOHQ, Hayman Road, Como (Perth WA) on Tuesday 24th October 1995, 8.15 AM - 5.00 PM.

To date, at least 10 speakers and 4 posters are confirmed for the symposium. Although speakers are nearly finalised, more items apecially posters are welcome from interested staff and community groups etc. Areas of interest include distribution of bridal creeper in a area, impacts on plant communities or species, control and management. A final agenda fot the symposium will be publicised soon.

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Back Issues of CALM News

If anyone has copies of early issues of CALM News, as the Departmental Archives have a few gaps. The issues are 1(3), 1(4), 1(6), 1(7), 1(8), 2(11), 2(19) and 3(30).

liasw@wood.sid

Classifieds

For Sale - Jarrah dining table, old (c. 1940's). Fully repolished and waxed - $500 (Offers considered.) Contact Margaret Lewington, Herbarium

Forthcoming Seminars

SID seminars

21 Sep 95 3:00 pm at Woodvale

- Sue Patrick, *Rare flora management programs of the south-west of Western Australia.*

20 Oct 95 3:00 pm at Training Centre, Como**

- Matt Williams, Ray Wills, Greg Keighery and Alex Chapman, *How to present science (NOT).*

**Note change of date from original announcement

24 Oct 95 **all day** at Training Centre, Como**

- Patrick Pigott & David Lamont, *Bridal Creeper Symposium.*

**Note change of date from original announcement

26 Oct 95 3:00 pm at Woodvale

- Nicki Marlow, Fox population dynamics in the pastoral zone.

Botany Dept., UWA Seminars

18 Sep 95 (Mon) 4 pm in Top Floor Seminar Room

- Ms Emma Cole. *The role of* Halophila ovalis *in biogeochemical cycling in the Swan River.*

25 Sep 95 (Mon) 4 pm in Top Floor Seminar Room

- Dr Neil Emery. *Phenotypic plasticity in alpine and prairie ecotypes of* Stellaria longipes.

Conservation Biology Discussion Group

2nd Tues of the month, 5.30 pm at University House, UWA.

- 12 Sep 95 Kristina Lemson, *Intrinsic values*

Contact: Kristina Lemson, Botany, UWA

School of Environmental Biology, Curtin Uni

Every Wed 12.00 noon, Watson Lecture Theatre (307:101)

- 20 Sep Marcello Pennacchio. *Biologically active compounds in the Australian plant genus* Eremophila.
- 25 Oct Dr Tony Friend. Perth's urban bandicoots and the conservation of the species.

Royal Society of WA

18 Sep 95 (Mon) 8pm.

- Mini-Symposium - *Remote Sensing and its applications.*

Australian Association of Bush Regenerators (WA)

13 Sep 95 (Wed) 8pm. Kings Park Adin. Centre

- Tein McDonald Uni West. Sydney. *How much help does the bush need - is bush regeneration viable?*

Social

Wine Club

SID Wine Club will be held on the last Friday of Sep and Oct 1995. Non-members welcome ($5 per head); please notify me no later than the Thursday before. Hosts, dates and venues are:

- 29 Sep at the Herbarium
- 27 Oct at Woodvale

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THOUGHT FOR THE DAY...

Here are some simple tips on how to save time that Matt Williams found in an old issue of Research News:

- Always plan first thing in the morning and set priorities for the day.
- Work alone creatively in the morning and use the afternoons for meetings, if necessary.
- If you seem to procrastinate ask yourself "What am I avoiding?" - and then confront the thing head-on.
- Put signs in your office reminding you of your goals.
- Start with the most profitable parts of large projects and you will find it is often unnecessary to do the rest.
- Concentrate on one thing at a time.
- Write replies to most letters right on the piece of paper.
- Try not to think of work on weekends...

USE OF HYPOTHESES IN THE SCIENCE AND INFORMATION DIVISION - RESPONSES

In the last issue of SIDNews, Ian Abbott presented an article entitled - *Use of Hypotheses in the Science and Information Division.* The Editors have received 2 responses to the article: one from Matthew Williams and the other from Nicholas Lander.

Matthew Williams

I enjoyed this article , and my only reservation about it is that it was too short. Because of this, the article oversimplified some aspects of the scientific method relating to hypothesis testing. In my comments below I try to clarify some of these aspects:

1. The article argues that the hypethetico-deductive method is the only method of science. This is wrong. Sir Ronald Fisher also stated (Fisher (1935): "The Design of Experiments") that the purpose of experimentation is to test hypotheses, and he was wrong too. Consider, for example, an experiment designed to compare five different tree species in their production of some commodity, say the amount of millable timber each produces after ten years. In a typical experiment, the five species would be planted together in a number of replicates, perhaps at a number of sites. The yield of timber would then be compared, and analysed, probably by ANOVA. The implicit null hypothesis underlying such an ANOVA is "(X): All five species produced the same amount of millable timber (i.e. the mean yields are all equal)" (this could be tested by the F statistic). However, nobody would ever believe such a null, and the purpose of this null is merely to provide a framework for the experiment. We do not even need to look at the F statistic, other than to assess the probability that any observed differences were due to chance. The real purpose of this experiment was "(Y): to objectively determine the best producing species, and to estimate its yield". It seems to me that to state hypothesis (X) as part of the aim of this experiment would be unneccesary (and indeed misleading), wheras (Y) should be stated as part of the aim.
2. Another point that I think needs clarification is the distinction between hypothesis testing and decision making. These two tasks, the former scientific and the latter political, are quite separate. In the discussion of the two alternate hypotheses (A: "Prescribed burning of jarrah forest in spring does not spread *Phytophthora* fungus"), and (B: "Prescribed burning of jarrah forest in spring causes the spread of *Phytophthora* fungus"), it is stated that "If the evidence collected does not refute (A), then we do not need to consider (B)". I agree that it is nonsensical to attempt to test (B), since (A) is a null hypothesis and hence more amenable to disproof. However, I think there are two points which should be noted:

   (i) To assume that (A) is true, until disproved, is to confuse the artifice of the hypethetico-deductive technique with common sense. Before we test (A), we do not know if *Phytophthora* fungus is spread by spring burning. We merely propose (A) (as a null hypothesis) because it is a (relatively) easy statement to test using the hypethetico-deductive technique. [As an aside, how we choose to manage the forest until (A) is proved or disproved is a purely political decision - it may be prudent, in order to protect the forest resource, to assume that (B) is true and act accordingly.] If the evidence collected does not refute (A), then we should still consider (B). We must always bear in mind that if our experiment is inadequate (for example, too small), then we may never be able to refute (A). In the final decision of whether (A) or (B) is true, we need to consider the weight of evidence relating to (A) and (B). If a very small experiment fails to reject (A), our chance of making a type II error (i.e. accepting (A) as true when in fact it is false) is high. Conversely, this chance is low if a very large/comprehensive/power--ful experiment was performed. [This fact has lead to certain environmental protection agencies in the US requiring that in environmental impact studies, the power of the experiment designed to detect an impact, is specified. Otherwise, the outcome could be "rigged" to provide a result of no impact, simply by doing a very small study.]

   In conclusion, in making decisions about the jarrah forest, managers need to consider both (A) and (B), and the chance that each is true. Thus it is perfectly defensible for managers to assume that (B) is true, if they adjudge that the evidence refuting (B) is weak. Just how much evidence is needed before (B) is refuted depends to some extent on how much

damage the spread of *Phytophthora* fungus does, versus the gains or savings to be made from spring burning. In other words, a political decision is still needed, based upon the scientific evidence.

(ii) At the conclusion of the article, it is stated that the formulation of the null hypothesis "... seems to be analagous to the presumption in criminal law of innocence until guilt is proven." I think it is worth pointing out that it is not necessarily reasonable to assume that because the presumption of innocence is used in criminal law, that it is a valuable assumption in all decision making situations. In law, the "presumption of innocence" (and associated "burden of proof" on the prosecution) is employed because society puts the cost of falsely imprisoning the innocent far above the cost of releasing the guilty. This is a value judgement, and if we as a society decide that it is far better to ensure the imprisonment of the guilty at the expense of punishing some innocents, it would be reasonable to reverse both the presumption of innocence and the burden of proof.

Thus, in the context of the hypotheses (A) and (B), if we consider spreading *Phytophthora* fungus very costly, it would be reasonable to assume that (B) is true until evidence disproving this is found. However, if we consider not spring burning more costly, we should perhaps assume that (A) is true until disproved.

In summary, I think it is necessary to keep clear the distinction between statistical and logical hypothesis testing, and decision making. Making decisions is all about value judgements and is thus a political activity. The hypethetico-deductive technique is simply one tool used to decide between alternate hypotheses. However, it is no substitute for "common sense" decision making.

Nicholas Lander

I think that Lakatos, Kuhn, Feyerabend, Chalmers and others have written more than enough to falsify the statement in Ian's article published in *SID News 1(4)* claiming "a logically impeccable foundation" for the so-called hypothetico-deductive method! In my view, the acceptance of the hypothetico-deductive method conditioned by Popperian falsification for workaday purposes is rather akin to our acceptance of Newtonian mechanics rather than the complexity of quantum mechanics to deal with the exigencies of everyday life . At best a convenient approximation, it doesn't bear close inspection: it is clearly a matter of cerebral economy; the logic against it is compelling.

Not all null hypotheses are subjected to the kind of statistical analysis suggested in Ian's article. In descriptive taxonomy, for instance, it is unusual (but by no means unheard of) to present such an analysis when splitting a taxon previously considered to represent a single species, a situation directly analagous to Ian's X and Y example. Perhaps it should be more widely applied. Rather, the argument hinges on a revision (or re-gathering) of the underlying observational data which is normally sufficiently dramatic to speak for itself without the need for statistical analysis as such. Witness Ian's own example of "The swans of Europe and Australia do not differ in colour": one hardly needs a t-test to falsify this null hypothesis.

Further, the claims of the falsificationsists are seriously undermined by the fact that some if not all observation statements are patently fallible. Which is to say that if a universal statement or complex of universal statements constituting a theory or part of a theory clashes with some observation, it may be the observation that is at fault. Nothing in the logic of the situation requires that it should always be the theory that is rejected. A fallible observation statement might be rejected and the fallible theory with which it clashes retained. Witness the conflict between the everyday observation that the moon is much larger when it is nearer the horizon than when it is high in the sky (still regarded as an unexplained illusion) with modern descriptions of the moon's trajectory. Chalmers (1988) devotes a whole chapter to the limitations of falsification which makes for very sobering reading..

I wonder if Ian's concern with the relationship between hypotheses and monitoring might not be broached via a brief consideration of the complimentary role of confirmation as apposed to falsification in science? This relates back to the twin notions of bold conjecture and novel prediction which Ian alludes to early in his article . Surely, a conjecture is more or less bold only when viewed against the background knowledge of the time. Further, the predictions of such a bold conjecture will necessarily be judged novel in that they involve some phenomenon that does not figure in, or is perhaps explicitly ruled out by the background knowledge of the time. Thus whenever a bold conjecture is confirmed cautious conjecture is necesarily falsified For this reason, *confirmations* of new theories are important in the growth of science in that they constitute evidence that a new theory is an improvement on the theory it replaces. All this is to say that insofar as monitoring serves the purpose of confirming the predictions of bold conjecture it, too, has its role to play.

The following fictitious example may serve to usefully illustrate some of the points I have made:

Hypothesis

A CALM plant taxonomist, through years of observation of species in the family in which she specialises, boldy conjectures that the well-accepted Genus A is polyphyletic, which is to say that as presently conceived it has more than one common ancestor and thus might more properly be classified into several genera.

Falsification of null hypothesis

To test the null hypothesis (ie that the putative genera are not different) our taxonomist resorts to the

methodology of cladistic analysis, employing all available and relevant data for these species and for those in several putatively related genera to reconstruct the most likely lineage leading to the evolution of the present-day species. It is discovered that there is but one most parsiminous evolutionary tree consistent with the observed facts, ie one tree assumes fewer evolutionary steps to have occurred than any other possible tree. According to this model, of the species currently included in Genus A, some share a common ancestor with Genus X, others with Genus Y. What is more, the level of signficance placed on these results is acceptable, ie the cladogram is reasonably robust. Since these results patently contradict the null hypothesis under test, the taxonomist now formally segregates the 101 species of Genus A into two genera, namely Genus A and Genus B.

Confirmation of new theory

Although this new classification initially proves somewhat controversial, over the next ten years the author of what is now considered a landmark paper continues to monitor all new collections of the species in the genera concerned. During this time, a dozen or so new species have been described, all of which fall neatly into her classification, thus confirming the underlying hypothesis and gaining broad general acceptance for it.

Rejection of fallible observation statement and retention of fallible theory

A couple of years ago there was an interesting new development. A colleague working in London drew our taxonomist's attention to a small fragment of a specimen in the British Museum which would seem to represent a species intermediate between Genus A and Genus B. This fragment was collected in the nineteenth century on the area of land apparently now occupied by the R & I Tower in central Perth. No other specimens are extant, and it has not been re-collected from the metropolitan area or beyond. Thus it would seem reasonable to presume that the species concerned is now extinct. Understandably, our taxonomist's managers have been unwilling to allow her to revisit her studies of genera A, B, X and Y -- at least until she has completed her current revision of the distantly related Genus Z which comprises some 300 or so species, many of which have been found to contain powerful anti-viral agents potentially of immense economic importance.

Articles such as Ian's are so very difficult to write. On the one hand, there is a need for a simplified account of methodology that can be acted upon. On the other, one must avoid venturing too far into a specialised area without the necessary specialist equipment, thus running the risk of giving hostages to fortune either by loosing the attention of one's readers or (worse still) by exposing one's own inevitably limited knowledge of the terrain, which has certainly changed a bit since Popper's time.

In conclusion, might it not be better to draw the attention of CALM's scientists to that excellent little book by A.F. Chalmers, namely *What is this thing called Science? An assessment of the nature and status of science and its methods* published by University of Queensland Press (1988) and currently available at a cost of $17.95? Chalmers is readable, comprehensive and balanced. He covers everthing from induction, through theory-dependent observation, falsification (Popper), theories as structures (Lakatos' Research Programmes, Khun's Paradigms), objectivism, anarchism (Feyerabend), realism, instrumentalism and truth, unrepresentative realism, and many other "isms".

Perhaps the more interesting issues raised by the taxonomic parable above are managerial rather than scientific in nature.